(19) World Intellectual Property Organization

International Bureau





(43) International Publication Date 14 July 2005 (14.07.2005) (10) International Publication Number WO 2005/064701 A3

(51) International Patent Classification': H01L 41/09, H01H 57/00

(21) International Application Number:

PCT/IB2004/052868

(22) International Filing Date:

20 December 2004 (20.12.2004)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

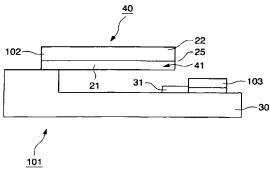
03104892.9 22 December 2003 (22.12.2003) EP

- (71) Applicant (for AE, AG, AL, AM, AT, AU, AZ, BA, BB, BE, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CY, CZ, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, SZ, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW only): KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (71) Applicant (for DE only): PHILIPS INTELLECTUAL PROPERTY & STANDARDS GMBH [DE/DE]; Steindamm 94, 20099 Hamburg (DE).

- (72) Inventors; and
- (75) Inventors/Applicants (for US only): KLEE, Mareike, K. [DE/DE]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). RIJKS, Theodoor, G., S., M. [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). LOK, Pieter [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). MAUCZOK, Ruediger, G. [DE/DE]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).
- (74) Agents: ELEVELD, Koop, J. et al.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,

[Continued on next page]

(54) Title: ELECTRONIC DEVICE



(57) Abstract: The microelectromechanical system (MEMS) element (101) comprises a first electrode (31) that is present on a surface of a substrate (30) and a movable element (40), which overlies at least partially the first electrode (31) and comprises a piezoelectric actuator, which movable element (40) is movable towards and from the substrate (30) by application of an actuation voltage between a first and a second position, in which the first position is separated from the substrate (30) by a gap. The piezoelectric actuator comprises a piezoelectric layer (25) which opposite surfaces is provided with a second and a third electrode (21,22) respectively, said second electrode (21) facing the substrate (30) and said third electrode (22) forming an input electrode of the MEMS element (101), so that a current path through the MEMS element (101) comprises the piezoelectric layer. The microelectromechanical system (MEMS) element (101) comprises a first electrode (31) that is present on a surface of a substrate (30) and a movable element (40). This overlies at least partially the first electrode (31) and comprises a piezoelectric actuator, which movable element (40) is movable towards and from the substrate (30) by application of an actuation volatge between a first and a second poistion, in which first position it is separated from the substrate (30) by a gap. Herein the piezoelectric actuator comprises a piezoelectric layer (25) that is on opposite surfaces provided with a second and a third electrode (21,22) respectively, said second electrode (21) facing the substrate (30) and said third electrode (22) forming an input electrode of the MEMS element (101), so that a current path between through the MEMS element (101), comprises the piezoelectric layer (25) and the tunable gap.





WO 2005/064701 A3



FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

with international search report

(88) Date of publication of the international search report:

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.